

REMARKS

Applicant has carefully studied the outstanding Official Action. The present remarks are intended to be fully responsive to all points of rejection. Favorable reconsideration and allowance of the present application are hereby
5 respectfully requested.

Claims 1 – 14, 26 – 31 and 37 – 52 were examined and are now in the case.

Claims 1 – 14, 26 – 31 and 37 – 52 stand rejected under 35 USC 103(a) as being unpatentable over Published US Patent Application US
10 2002/0118441 of Kang et al (Kang) and further in view of US Patent 6,636,337 to Johnson et al (Johnson).

Kang describes all-optical logic AND operation in a SOA (semiconductor optical amplifier)-based Mach-Zehnder interferometer.

Johnson describes an optical switching device based on stable, non-absorbing optical hard limiters which optically switches optical information from an input to a number of outputs based upon address information contained in the optical information.

Claim 1 recites, *inter alia*, a combination of a set of nonlinear elements in which a first subset of the set of nonlinear elements is configured to
20 function as a set of ON/OFF switches in the “OFF” state to enable a second subset of the set of nonlinear elements to be configured in at least one optical processing configuration.

In the outstanding Official Action the Examiner acknowledges, in the last line on page 2 and in the first line on page 3, that Kang does not specifically
25 teach a first and second subsets of nonlinear elements. Johnson also does not show or suggest first and second subsets of nonlinear elements. Since neither Kang nor Johnson show or suggest the first and second subsets of nonlinear elements, it is respectfully submitted that combining Kang with Johnson necessarily cannot show or suggest the combination recited in claim 1 of a set of nonlinear elements in which
30 a first subset of the set of nonlinear elements is configured to function as a set of ON/OFF switches in the “OFF” state to enable a second subset of the set of

nonlinear elements to be configured in at least one optical processing configuration.

Further in the outstanding Official Action, the Examiner takes the position that an optical computer performs many different tasks that require many combinations of different logic functions and units, and that Johnson teaches an optical information processing system using different logic operations including combination of AND logic operations that are in a rectangular arrangement and thus that it would have been obvious to one having ordinary skill in the art at the time the invention was made to use the Kang logic unit in various arrangements including in Johnson in order to perform a desired optical signal processing at very high speed.

10 However, even if, for the sake of argument only, such different logic operations would have been implemented by different subsets of nonlinear elements, Johnson and Kang still do not show or suggest the combination recited in claim 1 at least because Johnson and Kang do not show or suggest the first subset of the set of nonlinear elements which is configured to function as a set of ON/OFF switches in

15 the “OFF” state.

Additionally, it is respectfully submitted that there is no motivation to combine Kang with Johnson at least because combining Kang with Johnson does not result in the combination recited in claim 1 and has nothing to do with the combination recited in claim 1. Specifically, if, for the sake of argument only, a person skilled in the art would have combined Kang with Johnson, such a combination would have merely resulted in usage of the SOA-based Mach-Zehnder interferometer of Kang as an optical AND gate in Johnson. Such a combination of Kang with Johnson does not result in and has nothing to do with the combination recited in claim 1 of a set of nonlinear elements in which a first subset of the set of nonlinear elements is configured to function as a set of ON/OFF switches in the “OFF” state to enable a second subset of the set of nonlinear elements to be configured in at least one optical processing configuration.

Combining Kang with Johnson is therefore inappropriate for rejecting claim 1.

30 Thus, Applicant respectfully points out that the Examiner has failed to make a *prima facie* case for the unpatentability of claim 1.

Claim 1 is therefore deemed allowable.

Claims 2 – 11 depend directly or indirectly from claim 1 and recite additional patentable subject matter.

Also, as regards claim 7 it is respectfully submitted that Kang does not 5 show or suggest two output signals and therefore Kang necessarily cannot show or suggest a combination as recited in claim 7 in which the second subset of the set of nonlinear elements comprises a first nonlinear element inter-configuration outputting a first output signal in a first direction, and a second nonlinear element inter-configuration outputting a second output signal in a second direction, the 10 second direction being essentially opposite to the first direction.

Claims 2 – 11 are therefore deemed allowable.

Claim 12 recites, inter alia, a combination in which the photonic device is controlled to enable performance of the optical processing operation on the 15 input optical signal by the set of nonlinear elements to output an optical processing result to a first output route when the second nonlinear element is turned to an “ON” state and the first nonlinear element is turned to an “OFF” state, and to switch the input optical signal to a second output route by turning the first nonlinear element to an “ON” state when the second nonlinear element is turned to an “OFF” state.

It is respectfully submitted that the combination recited in claim 12 is 20 neither shown nor suggested in Kang. Specifically, any output from the SOA-based Mach-Zehnder interferometer of Kang is provided by way of a single output route originating from the 2nd SOA only (it is the route in Fig. 1 of Kang via which the “changed output signal” at λ_1 is outputted) and therefore Kang does not show or suggest first and second output routes and output via the first or the second output 25 route.

Johnson also does not show or suggest the combination recited in claim 12.

Furthermore, it is respectfully submitted that there is no motivation to 30 combine Kang with Johnson at least because combining Kang with Johnson merely results in usage of the SOA-based Mach-Zehnder interferometer of Kang as an optical AND gate in Johnson and such a combination of Kang with Johnson has

nothing to do with the combination recited in claim 12.

Combining Kang with Johnson is therefore inappropriate for rejecting claim 12.

5 Thus, Applicant respectfully points out that the Examiner has failed to make a *prima facie* case for the unpatentability of claim 12.

Claim 12 is therefore deemed allowable.

Claims 13 and 14 depend from claim 12 and recite additional patentable subject matter.

Claims 13 and 14 are therefore deemed allowable.

10 The arguments submitted above with respect to the patentability of claim 1 also apply to claim 26.

Claim 26 is therefore deemed allowable.

Claims 27 – 29 depend from claim 26 and recite additional patentable subject matter.

15 Claims 27 – 29 are therefore deemed allowable.

Claim 30 is a method claim corresponding to claim 12. The arguments submitted above with respect to the patentability of claim 12 also apply to claim 30.

Claim 30 is therefore deemed allowable.

20 Claim 31 depends from claim 30 and recites additional patentable subject matter.

Claim 31 is therefore deemed allowable.

The arguments submitted above with respect to the patentability of claim 1 also apply to claim 37.

Claim 37 is therefore deemed allowable.

25 Claims 38 – 40 depend from claim 37 and recite additional patentable subject matter.

Claims 38 – 40 are therefore deemed allowable.

Claims 41 – 46 depend from claim 1 and recite additional patentable subject matter.

30 Claims 41 – 46 are therefore deemed allowable.

Claims 47 and 48 depend from claim 12 and recite additional patentable subject matter.

Claims 47 and 48 are therefore deemed allowable.

Claims 49 – 52 depend from claim 26 and recite additional patentable
5 subject matter.

Claims 49 – 52 are therefore deemed allowable.

Applicant has also carefully studied the other prior art of record including US Patent 4,864,524 to Guilfoyle et al (Guilfoyle), US Patent 6,804,047 to Byun et al (Byun), and US Patent 5,999,283 to Roberts et al (Roberts) which were
10 not applied in rejecting the claims of the present application.

Guilfoyle describes an optical computer apparatus and method in which binary operations are implemented by utilizing optical elements to perform AND-OR-INVERT operations of the binary operation and combinatorial logic elements perform the remaining operations.

15 Byun relates to an all-optical OR device embodied by using the gain saturation and wavelength conversion characteristics of semiconductor optical amplifier (SOA), and more particularly, to a technique to embody an all-optical OR gate that performs all-optical logic operation by utilizing optical signals transmitted at arbitrary points of optical circuits such as optical computing circuits as the pump
20 signal and the probe signal.

Roberts describes an optical logic device which is provided by an interferometer having an output which defines a logic state 1 or 0 in dependence upon an interference condition existing in the interferometer.

Applicant finds that Guilfoyle, Byun, and Roberts do not affect
25 patentability of the claims of the present application, either taken separately or in combination with any of the other prior art of record.

In view of the foregoing remarks, it is respectfully submitted that the present application is now in condition for allowance. Favorable reconsideration and allowance of the present application are respectfully requested.

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Respectfully submitted,



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10 Date: August 29, 2005